A systematic review on the effectiveness and proper technique of repositioning for the prevention of pressure ulcers among immobile patients.

Cassandra E. Coville

The Ohio State University

Abstract

Every year, it is estimated that a total of 2.5 million pressure ulcers are treated in the United States. However, while repositioning, that is changing patient position to alter pressure on the skin, is common practice, it is still unclear if this is the best method for preventing pressure ulcers. The purpose of this study was to conduct a systematic literature review to determine the strength of the evidence on repositioning immobile patients to prevent pressure ulcers. Using keywords associated with articles on the topic, two databases were searched: PUBMED and CINAHL. Inclusion criteria for articles were studies on humans, English language, and outcome being effect of repositioning. Fourteen articles met the inclusion criteria of this study, and data were abstracted to a standardized form. Nine studies supported the use of repositioning in pressure ulcer prevention to varying degrees and the other five concluded that more research was necessary. The best time intervals and process for repositioning were inconclusive. Although this systematic review did not find conclusive evidence to support repositioning, there was also no harm reported from following the practice. The majority of the studies reviewed found that repositioning does help prevent pressure ulcers. Further research is needed on the time intervals for repositioning, as well as the process such as using technology-driven mattresses versus simply moving patients to a different position.

Keywords: pressure ulcers, repositioning, systematic review

A systematic review on the effectiveness and proper technique of repositioning for the prevention of pressure ulcers among immobile patients.

Introduction

It is estimated that a total of 2.5 million pressure ulcers are treated annually in the United States (Berlowitz, 2014). Studies have found that 60% of older adults that acquire pressure ulcers die within a year (Lyder & Ayello, 2008). The pressure ulcer itself is not normally the cause of death, but it is known to lead to decline of an individual's health and eventually death. Pressure ulcer treatment and its associated morbidity is also a very expensive medical problem. It costs between $37,00 and $70,000 to treat a patient with a pressure ulcer (Chou et al., 2013). Also, Medicare and Medicaid plans will not reimburse hospitals that allow patients to acquire pressure ulcers while under their care.

Pressure ulcers occur due to pressure, friction and shearing on the skin, which causes less perfusion of blood to a certain area of the body (Berlowitz, 2014). This lack of perfusion leads to tissue breakdown in that area and ultimately the possibility of necrosis. Malnutrition, altered mental status, incontinence, sensory loss and immobility are some of the factors that can contribute to the development of a pressure ulcer (Lyder & Ayello, 2008). Many people in hospitals are immobile due to their sickness and treatment needs, which means a large part of the patient population is vulnerable to immobility that could lead to pressure ulcer development. One study argued that immobility was the most important risk factor for pressure ulcer development when compared against moisture, length of hospitalization, serum albumin and weight (Lindgren et al., 2003). Since immobility is an important risk factor, nursing staff needs

to identify the risk factor proactively and include repositioning, a suggested intervention to combat this problem, into the plan of care.

Although repositioning seems to be a common practice used in health care prevention of pressure ulcers, there are questions as to whether this is an evidence-based practice. Repositioning is typically done by changing the position of a patient after a certain amount of time has passed. The goal is to keep the patient from putting pressure on the same area of tissue for an extended period of time, which hopefully leads to prevention of pressure ulcers. Repositioning can, however, disrupt certain parts of a patient's healing process. Most turning schedules are every two to three hours and could bring on additional discomfort due to pain and disturbed sleep/rest. Excessive pain can slow down the healing process and rest also plays an important part in recovery while in the hospital. Because there may be adverse effects related to repositioning it is important to establish the evidence base in this area for continuing this practice.

Purpose

The purpose of this systematic review was to describe the evidence on the efficacy of repositioning immobile patients for the prevention of pressure ulcers and determine best practices for timing and method of repositioning.

The specific objectives of this review were to: 1) identify published research findings on the effects of repositioning and 2) based on the research findings, determine best practices with regards to prevention of pressure ulcers in immobile patients.

Methods

To find our evidence, we searched PubMed using the keywords 'pressure ulcers' and 'repositioning'. We filtered the resulting articles for human subjects, sources

published within the last five years, and written in the English language. This narrowed our literature search down to 35 articles total. The titles and abstracts of these 35 were reviewed for match with our topic and articles that did not assess methods of preventing pressure ulcers were eliminated.. After reading the 16 remaining articles thoroughly, four more were eliminated from our study due to specific research relating to vented patients and lack of information specific to repositioning. A total of 12 articles were deemed appropriate for our review. Data from from these articles were abstracted into a table (Table 1) and synthesized below. The primary reviewer abstracted relevant data. From this both reviewers drew conclusions about the data extracted and came to a consensus on whether or not turning is an effective intervention in preventing pressure ulcers in immobile patients.

Results

Overall there is support for the repositioning of immobile patients for the prevention of pressure ulcers, but the method of repositioning needs additional research. The majority of the articles reviewed (seven) found evidence that supported the use of turning in pressure ulcer prevention (Bergquist-Beringer, Don, He, & Dunton, 2013; Brindle et al., 2013; Moore, Cowman & Posnett, 2013; Neilson, Avital, Willock, & Broad, 2014; Peterson, Gravenstein, Schwab, Van Oostrom, & Caruso, 2013; Still et al., 2013; Wong, 2011). From these seven articles that supported the use of repositioning for pressure ulcer prevention, four of them recognized the need for more research on the proper method of turning. The remaining five articles in our review discussed the need for more evidence in order to make a decisive practice change (Moore & Cowman, 2012;

Peterson, Schwab, Van Oostrom, Gravenstein, & Caruso, 2010; Reddy, 2011; Rich et al., 2011; White-Chu & Reddy, 2013).

Five of the included articles were reviews (Brindle at al., 2013; Moore & Cowman, 2012; Neilson et al., 2014; Reddy, 2011, White-Chu & Reddy, 2013). Bergquist-Beringer et al. (2013) was a retrospective medical record review. Peterson et al. (2010) and Peterson et al. (2013) were both descriptive observational studies. Two studies were experimental (Moore et al., 2013 & Still et al., 2013), and two were cohort studies (Rich et al., 2011; Wong, 2011).

Overall, repositioning was reported to be effective, and all agreed that the benefits of doing so outweigh the inconveniences. Bergquist-Beringer et al. (2013) found that repositioning decreased the likelihood of pressure ulcers by 14% . This study also found that when patients and families refused repositioning, the patient's risk for development of a pressure ulcer rose significantly, highlighting the importance of patient and family education around this intervention. Peterson et al. found that always-at-risk skin areas were less likely to get pressure ulcers when turned, no matter how the repositioning was performed (2013). Still et al. (2013) found stage one and stage two pressure ulcers to be more preventable than later stage ulcers.

The recommended amount of time between repositioning varied. Two articles found that frequent repositioning every two hours was effective (Brindle et al., 2013 & Still et al., 2013), while others found that more frequent intervals were necessary (Wong, 2011). Wong (2011) discovered that relieving skin perfusion after two hours of sitting supine did not allow the transcutaneous oxygen to return to preload level. Brindle et al. (2013) found that early and aggressive mobilization methods were most effective. Moore

et al. (2013) found that repositioning every three hours was effective clinically and in regards to allocation of nursing time. Other articles did not specify turning intervals (Peterson et al. 2013 & Bergquist-Beringer et al., 2013) or found that turning patients every 6 hours was adequate (Neilson et al., 2014, p. 20). The variation in results on turning intervals indicates that more research is needed around the time interval of repositioning to effectively prevent pressure ulcers.

Since repositioning takes time and may require more than one nurse or other patient care personnel, Moore et al. (2013) looked at the best repositioning technique in order to effectively allocate nursing time while preventing pressure ulcers. This study found that a frequent turning regimen using a 30-degree tilt every three hours was most effective clinically and in terms of using nursing effort. Another study found a way to increase nursing productivity through creating a turn team for the hospital whose job was to turn all the patients on certain time intervals, ensuring that repositioning was being done (Still et al., 2013).

Five articles discussed that there was a need for additional research to make a definitive recommendation for or against turning. The Cochrane Review by Moore and Cowman (2012) concluded that there were no studies published with strong enough evidence supporting the benefits of turning. Another study could not find adequate evidence to support the repositioning practice and therefore suggested optimizing patient care as a default until more research with definitive results was published (White-Chu & Reddy, 2013, p. 115). Peterson et al. (2010) found that standard turning was not able to take the load off all areas of skin pressure and more research is needed on the specific interventions (p. 1561). However, they did note pillows to be better at relieving triple

jeopardy areas as opposed to wedges. Two articles were not able to find an association with specific turning regimens and lower pressure ulcer rates (Reddy, 2011 & Rich et al., 2011). Rich et al. (2011) found that turning may only be beneficial for patients who are at high risk of developing pressure ulcers, which is indicated by a low Braden Score. Reddy (2011) concluded that turning might not be a significantly better intervention than standard care alone.

Strengths and Limitations

Four studies included in this review had large sample sizes of $n \geq 100$ (Bergquist-Beringer et al., 2013; Moore et al., 2013; Rich et al., 2011; Still et al., 2013). Two of these studies were experimental designs, one of which was a randomized control trial (Moore et al., 2013 & Still et al., 2013). Overall these might be viewed as strengths; however, it is evident that this area of research is still in a developmental stage.

Limitations included lack of samples including diversity of age, gender and sex. For example, Peterson et al. (2010) had 92% male subjects and Rich et al. (2011) only studied adults greater than 65 years old.

The studies did not control for preexisting conditions of participants that put them at a greater risk for skin break down (hypertension, diabetes, etc.), which limits the generalizability to samples outside those in the studies. Articles that researched specific patient populations like Peterson et al. (2010) did with intensive care unit patients, limited the ability for generalizing their results to a larger patient population. Although Bergquist-Beringer et al. (2013) had a large sample size, Magnet hospitals were over represented and patients were voluntarily included in the study. Magnet hospital status

could have led to different evidence based practices being implemented compared to non-Magnet hospitals.

There is a lack of technology to numerically identify the degree to which a pressure ulcer is forming. Peterson et al. (2010) and Peterson et al. (2013) used interface pressure mapping, but this mapping cannot directly measure internal tissue and capillary pressures. With pressure ulcers being staged subjectively based on visual characteristics, it is difficult to determine the validity of data and compare the severity of pressure ulcers.

Another limitation is based on the lack of data around repositioning. It could be deemed unethical to have a control group who does not get turned since this could put the patient's wellbeing at risk, making research in this area very difficult.

Discussion

Our results were inconsistent in identifying if repositioning is the best practice for pressure ulcer prevention. The majority of the studies reviewed concluded that repositioning can be helpful in the prevention of pressure ulcers. Therefore, eliminating the practice may serve to be more harmful to the patient than beneficial. Despite the discomforts to the patient, such as waking or pain, we recommend that careful attention still be paid to repositioning for immobile patients and that more research is warranted on the specifics of the practice such as turning intervals, supportive equipment, etc. , and the degree these practices alleviate pressure ulcers. Time ratios, angle of turn or beneficial equipment would be good areas for further research. More robust randomized control trials with diverse samples would also significantly contribute to understanding best practices for repositioning.

References

Bergquist-Beringer, S., Dong, L., He, J. & Dunton, N. (2013). Pressure ulcers and prevention among acute care hospitals in the United States. *The Joint Commission Journal on Quality and Patient Safety, 39*(9), 404-414.

Berlowitz, D. (2014). Epidemiology, pathogenesis and risk assessment of pressure ulcers. *UpToDate*. Retrieved from http://www.uptodate.com.proxy.lib.ohio-state.edu/contents/epidemiology-pathogenesis-and-risk-assessment-of-pressure-ulcers?source=search_result&search=pressure+ulcers&selectedTitle=2~120

Brindle, C. T., Malhotra, R., O'Rourke, S., Currie, L., Chadwik, D., Falls, P., Adams, C., Swenson, J., Tuason, D., Watson, S. & Creehan, S. (2013). Turning and Repositioning the Critically Ill Patient With Hemodynamic Instability: A Literature Review and Consensus Recommendations. *Journal of Wound, Ostomy and Continence Nursing, 40*(3), 254-267. doi: 10.1097/WON.0b013e318290448f

Chou, R., Dana, T., Bougatsos, C., Blazina, I., Starmer, A., Reitel, K., & Buckley, D. (2013). *Pressure Ulcer Risk Assessment and Prevention: Comparative Effectiveness*. *Comparative Effectiveness Reviews, No. 87*. Rockville, MD: Agency for Health Care Research and Quality.

Lindgren, M., Unosson, M., Fredrikson, M., & Ek, A. (2004). Immobility – a major risk factor for development of pressure ulcers among adult hospitalized patients: a prospective study. *Scandinavian Journal of Caring Sciences*, *18*, 57-64.

Lyder, C. H., & Ayello, E. A. (2008). Pressure Ulcers: A Patient Safety Issue. In R. G. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses* (Chapter 12). Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK2650/

Moore, Z., Cowman, S. & Posnett, J. (2013). An economic analysis on repositioning for the prevention of pressure ulcers. *Journal of Clinical Nursing, 22*, 15-16. doi: 10.1111/j.1365-2702.2012.04310.x

Moore, Z. E. & Cowman, S. (2012). Repositioning for treating pressure ulcers. *Cochrane Database of Systematic Reviews, 9*. doi: 10.1002/14651858.CD006898.pub3

Neilson, J., Avital, L., Willock, J. & Broad, N. (2014). Using a national guideline to prevent and manage pressure ulcers. *Nursing Management, 21*(2), 18-21.

Peterson, M. J., Gravenstein, N., Schwab, W. K., Van Oostrom, J. H. & Caruso, L. J. (2013). Patient repositioning and pressure ulcer risk--monitoring interface pressures of at-risk patients. *Journal of Rehabilitation Research & Development, 50*(4), 477-488. doi:10.1682/JRRD.2012.03.0040

Peterson, M.J., Schwab, W., Van Oostrom, J.H., Gravenstein, N. & Caruso, L.J. (2010). Effects of turning on skin-bed interface pressures in healthy adults. *Journal of Advanced Nursing*, *66*(7), 1556-1564. doi: 10.1111/j.1365-2648.2010.05292.x

Reddy, M. (2011, May 5). Pressure Ulcers. *British Medical Journal Clinical Evidence, 1901*. PMCID: PMC3217823.

Rich, S. E., Margolis, D., Shardell, M., Hawkes, W. G., Miller, R. R., Amr, S. & Baumgarten, M. (2011). Frequent manual repositioning and incidence of pressure ulcers among bed-bound elderly hip fracture patients. *Wound Repair and Regeneration, 19*, 10–18. doi: 10.1111/j.1524-475X.2010.00644.x

Still, M. D., Cross, L. C., Dunlap, M., Rencher, R., Larkins, E. R., Carpenter, D. L., Buchman, T. G. & Coopersmith, C. M. (2013). The turn team: a novel strategy for reducing pressure ulcers in the surgical intensive care unit. *Journal of the*

American College of Surgeons, 216(3), 373-379. doi:10.1016/j.jamcollsurg.2012.12.001

White-Chu, E. F. & Reddy, M. (2013). Pressure ulcer prevention in patients with advanced illness. *Current Opinion in Supportive and Palliative Care, 7*(1), 111-115. doi:10.1097/SPC.0b013e32835bd622

Wong, V. (2011). Skin blood flow response to 2-hour repositioning in long-term care residents: a pilot study. *Journal of Wound, Ostomy & Continence Nursing, 38*(5), 529-537. doi:10.1097/WON.0b013e31822aceda